Supplemental Hydrology Report

The Highlands at Warner Springs

Prepared By:
San Dieguito Engineering, Inc.
4407 Manchester Ave., Suite 105
Encinitas, CA 92024

For:

Warner Springs Estates, LLC
1037 Didrickson Way
Laguna Beach, CA 92651

Updated November 07, 2007
Date February 02, 2007
SDE Job No. 5174.00

TM 5450, SPA 06-001, ER 8104006A

Warner Springs
Canada Verde Drainage Basin

LATITUDE: 33° 18' 45"
LONGITUDE: 116° 33' 45"

100 YEAR STORM

P_6 =   4.3 in.

P_{24} =   11 in.

P_6 ADJ =   5 in.

Stream length	4.50 mi
Elevation Top	6,370.0
Elevation Bottom	3,539.9
ΔE	2,830.1 ft.
ΔE_{eff}	2,272.2 ft.
T_c =	45.18 min.
I_{100}	3.18 in/hr

C-VALUE
Low Density Residential (1.0 DU/AC or less)

BASIN ACREAGE

TOTAL	1,490.9 AC				
SOIL TYPE A	83.0 AC	5.6%	SOIL TYPE A	0.27	
SOIL TYPE B	815.8 AC	54.7%	SOIL TYPE B	0.32	
SOIL TYPE C	592.1 AC	39.7%	SOIL TYPE C	0.36	

COMPOSITE C-VALUE =   0.33

CI = (.33)(3.18) =   1.06

Q_{100} = CIA =   **1,582 CFS**

EFFECTIVE SLOPE FOR NATURAL WATERSHEDS

DATE:	5-22-2006	XMAX	23784.00
PROJECT NAME:	Warner Springs	AREA UNDER STREAM PROFILE	111214007.25
PROJECT No.:	5174	EFFECTIVE SLOPE (m)	0.09553
REFERENCE:		H + OUTLET ELEV	5812.10
COMMENT:			
WATERSHED:			
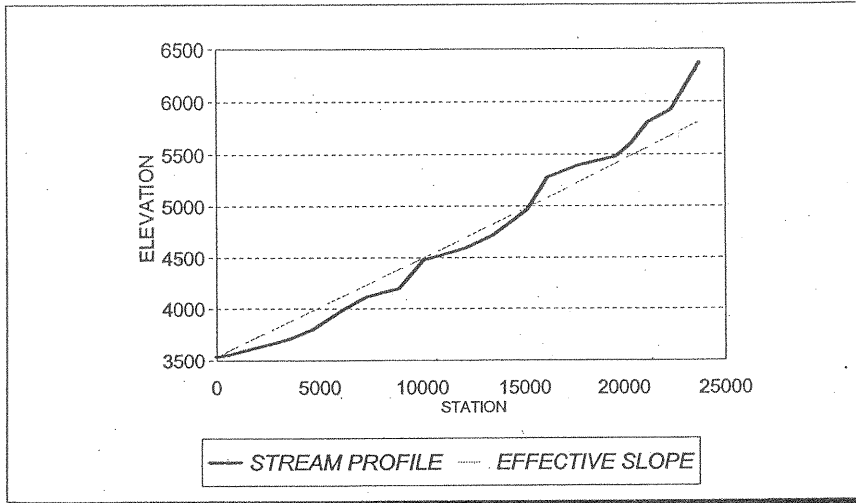
STREAM COORDINATES		EFF SL
STATION	ELEVATION	ELEV
0	3539.9	3539.90
655	3560	3602.48
1388	3600	3672.50
2971	3680	3823.73
3643	3720	3887.93
4658	3800	3984.90
6210	4000	4133.17
7328	4120	4239.98
8036	4160	4307.62
8877	4200	4387.96
10066	4480	4501.55
10837	4520	4575.21
12165	4600	4702.08
13475	4720	4827.23
15129	4960	4985.25
16142	5280	5082.02
17812	5400	5241.57
19617	5480	5414.01
20389	5600	5487.76
21208	5800	5566.00
22374	5920	5677.40
23784	6370	5812.10

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

$116°33'45"$

$33°18'45"$

$P_6 = 4.3 in$

DPW GIS
Department of Public Works
Geographic Information Systems

SanGIS
We Have San Diego Covered!

N
W E
S
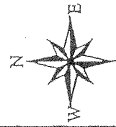
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event – 24 Hours

.... Isopluvial (inches)

$116° 33' 45''$
$33° 18' 45''$

$P_{24} = 11.0 \text{ in}$

DPW GIS
Department of Public Works
Geographic Information Systems

SanGIS
We Have San Diego Covered!
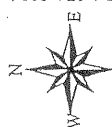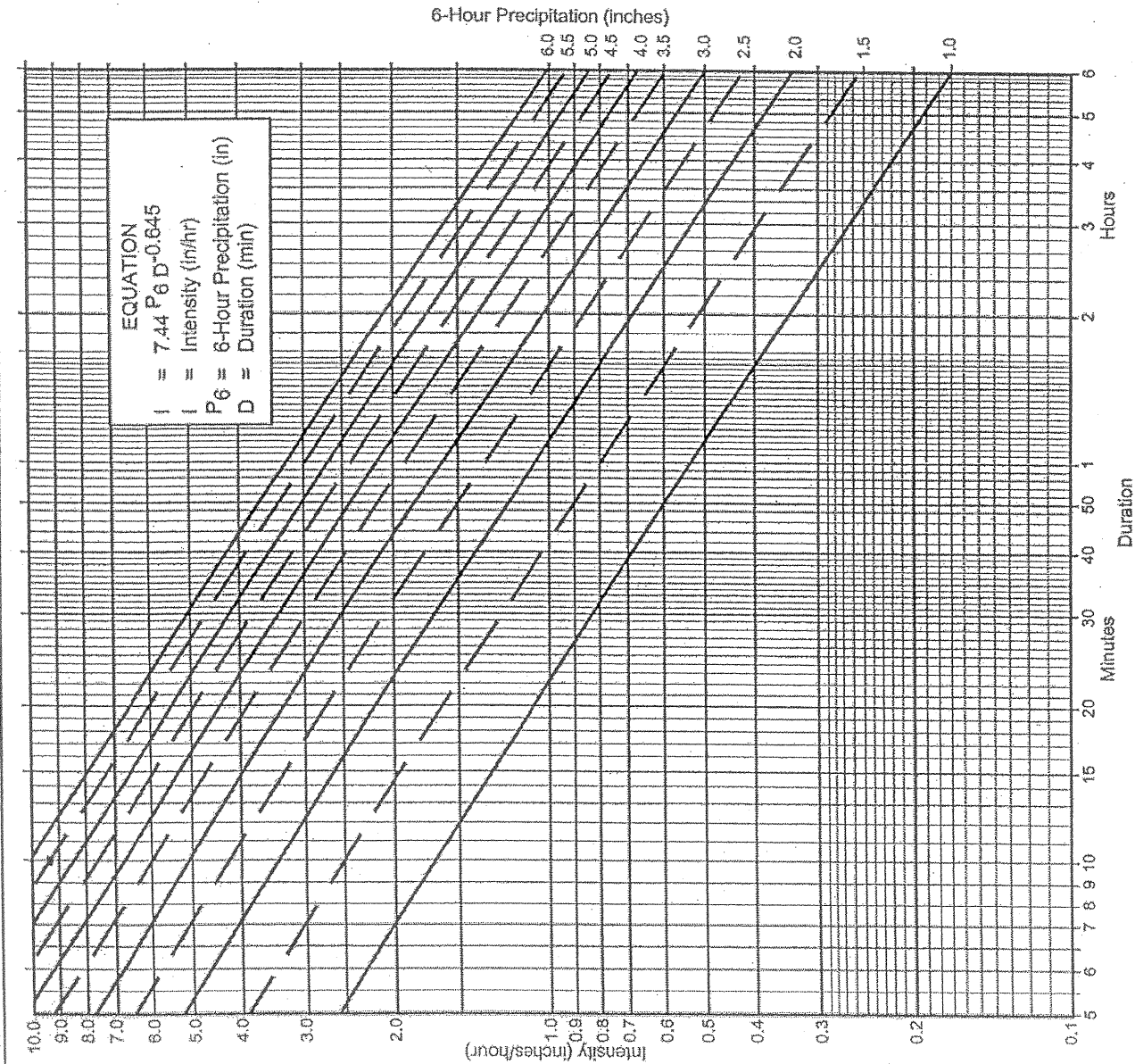
3   0   3   Miles

Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency __100__ year

(b) P_6 = __4.3__ in., P_{24} = __11.0__, $\frac{P_6}{P_{24}}$ = __39.1__ %[2]

(c) Adjusted P_6[2] = __5.0__ in.

(d) t_x = __5__ min.   _minimum, assumed_

(e) I = __13.17__ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

EQUATION

$$I = 7.44\,P_6\,D^{-0.645}$$

I = Intensity (in/hr)
P_6 = 6-Hour Precipitation (in)
D = Duration (min)

P6 Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.35	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

SECTION 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05300	ft/ft
Discharge	1582.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	3575.00
0+18	3570.00
0+36	3565.00
0+44	3560.00
0+53	3555.00
0+71	3550.00
0+91	3543.60
1+10	3550.00
4+26	3555.00
4+78	3560.00
5+07	3565.00
5+25	3570.00
5+43	3575.00

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+00, 3575.00)	(5+43, 3575.00)	0.045

Results

Normal Depth	5.87	ft
Elevation Range	3543.60 to 3575.00 ft	
Flow Area	105.02	ft²
Wetted Perimeter	37.65	ft
Top Width	35.77	ft

SECTION 1

Results

Normal Depth	5.87	ft
Critical Depth	7.47	ft
Critical Slope	0.02466	ft/ft
Velocity	15.06	ft/s
Velocity Head	3.53	ft
Specific Energy	9.40	ft
Froude Number	1.55	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.87	ft
Critical Depth	7.47	ft
Channel Slope	0.05300	ft/ft
Critical Slope	0.02466	ft/ft

5/22/2006 4:25:54 PM

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemons Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

FlowMaster [08.01.058.00]
Page   2 of   2

Cross Section for SECTION 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05300	ft/ft
Normal Depth	5.87	ft
Discharge	1582.00	ft³/s
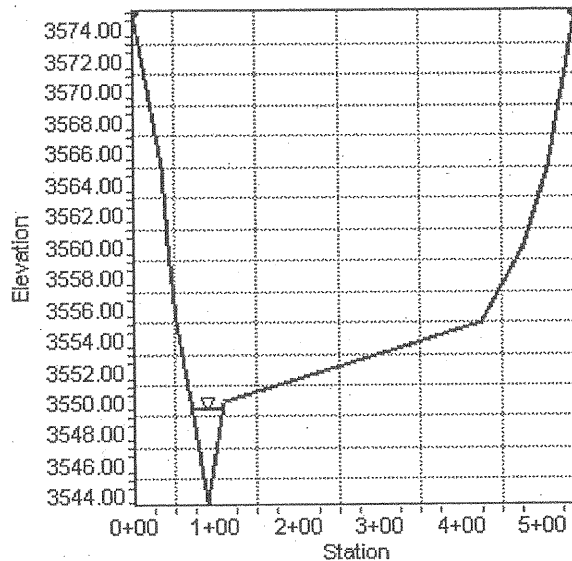
Cross Section Image

SECTION 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02900	ft/ft
Discharge	1582.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+13	3565.00
0+24	3560.00
0+32	3556.87
1+47	3560.00
4+93	3560.00
6+05	3565.00

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(0+13, 3565.00)	(6+05, 3565.00)	0.045

Results

Normal Depth	3.46	ft
Elevation Range	3556.87 to 3565.00 ft	
Flow Area	347.74	ft²
Wetted Perimeter	477.87	ft
Top Width	477.16	ft
Normal Depth	3.46	ft
Critical Depth	3.43	ft
Critical Slope	0.03330	ft/ft
Velocity	4.55	ft/s
Velocity Head	0.32	ft
Specific Energy	3.78	ft
Froude Number	0.94	

SECTION 2

Results

Flow Type   Subcritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.46	ft
Critical Depth	3.43	ft
Channel Slope	0.02900	ft/ft
Critical Slope	0.03330	ft/ft

Cross Section for SECTION 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02900	ft/ft
Normal Depth	3.46	ft
Discharge	1582.00	ft³/s
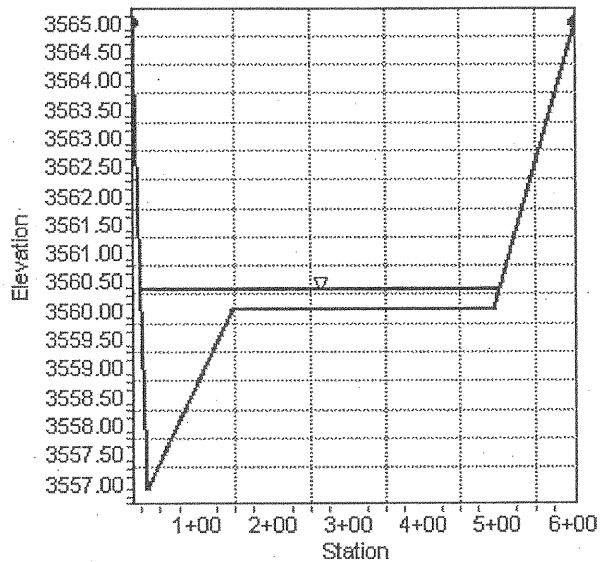
Cross Section Image

5/23/2006 7:58:39 AM

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemons Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

FlowMaster [08.01.058.00]
Page   1 of   1

SECTION 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03100	ft/ft
Discharge	1582.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+07	3600.00
1+19	3595.00
1+36	3590.00
1+52	3585.00
1+60	3580.00
1+70	3575.00
1+90	3570.00
2+67	3565.00
3+26	3570.00
7+21	3570.00
7+83	3575.00
8+08	3580.00
8+20	3585.00
8+37	3590.00
8+61	3595.00
8+83	3600.00

Roughness Segment Definitions

Start Station & Elevation	End Station & Elevation	Roughness Coefficient
(1+07, 3600.00)	(8+83, 3600.00)	0.045

Results

Normal Depth	3.67	ft
Elevation Range	3565.00 to 3600.00 ft	

SECTION 3

Results

Flow Area	182.05	ft²
Wetted Perimeter	99.60	ft
Top Width	99.33	ft
Normal Depth	3.67	ft
Critical Depth	3.85	ft
Critical Slope	0.02381	ft/ft
Velocity	8.69	ft/s
Velocity Head	1.17	ft
Specific Energy	4.84	ft
Froude Number	1.13	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.67	ft
Critical Depth	3.85	ft
Channel Slope	0.03100	ft/ft
Critical Slope	0.02381	ft/ft

5/23/2006 7:59:36 AM

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemons Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

FlowMaster [08.01.058.00]
Page 2 of 2

Cross Section for SECTION 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

|		
Channel Slope	0.03100	ft/ft
Normal Depth	3.67	ft
Discharge	1582.00	ft³/s

Cross Section Image
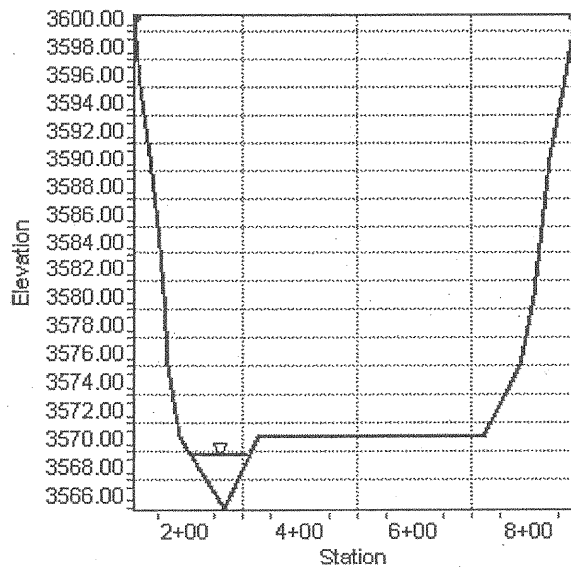
**ADDITIONAL INFORMATION BASED
ON FLOWN TOPOGRAPHY**

31-18-14
3656.47

3669.0
3649.0
3642.0
3699.0
3708.0
3657.0
3675
3664.0
3652.0
3678.0

BOUNDARY

RANCHO

3650
3625
3683.0
3663.0
3620.0
3679.0

3627.0

3600

JOSE

PROPERTY BOUNDARY

SAN

LOS COYOTES ROAD

DEL

3650

3638.0

3625

VALLE

BOUNDARY

3600

3575

3625

100-YEAR STORM
LINE OF INUNDATION

SECTION 3

3634.0

3638.0

3600

3625

3617.0

3600

3579.0

3575

SECTION 2

R3E
R4E

3654.0

EXISTING 45" CMP CULVERT

SECTION 1

R3E

3604.0

3600

3575

3550

VERDE

WARNER SPRINGS

CANADA VERDE BASIN

100-YEAR STORM

LINE OF INUNDATION

GRAPHIC SCALE

(IN FEET)
1 inch = 80 ft.

WARNER SPRINGS
CANADA VERDE BASIN
HYDROLOGY MAP

BASIN BOUNDARY
1,490.9 AC

PROPERTY BOUNDARY

6370.0

3539.9

EXISTING 45" CMP CULVERT
Q_{100} = 1,582 CFS

GRAPHIC SCALE

(IN FEET)
1 inch = 800 ft.

SAN DIEGUITO ENGINEERING, INC

4407 MANCHESTER, SUITE 105
ENCINITAS, CA 92024
PHONE: (760) 753-5525

CIVIL ENGINEERING • PLANNING
LAND SURVEYING